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Philosophical Transactions

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A LETTER.

Written by Dr. John Wallis to the Publisher, concerning the Variety of the Annual High-Tydes, as to several places; with respect to his own Hypothesis, deliver'd N^o. 16, touching the Flux and Reflux of the Sea.

SIR, In my *Hypothesis* for Tydes, you may remember, that I cast the *Annual High-Tydes* not on the *Two Æquinoxes*, about the 11. of *March* and *September*; nor yet on the *Apogæum* and *Perigæum* of the *Sun*, about the middle of *June* and *December*; but (as proceeding from a Complication of those two Causes) on a Middle time between the *Perigæum* and the *two Æquinoxes*, (like as is the greatest Inequality of the *Natural daies*, proceeding from a Complication of the same Causes.) And particularly, for the *Coast of Kent* (and consequently the Rivers of *Thames* and *Medway*) about the beginning of *November* and *February*: which agrees with Observations on those *Coasts*, and particularly with that of yours of *Febr. 5.* this year.

The last year, when I was present in the *R. Society*, I remember, an account was brought us of the *Annual High-Tydes* on the *Severn*, and at *Chepstow-bridge*, to be about the *beginning* of *March*, and the *end* of *September*. Which though they agree not with the particular times on the coast of *Kent*, yet in the general they agree thus far, That the one is about as much *before* the *one Æquinox*, as the other is *after* the *other Æquinox*. You now acquaint me with High-Tides about *February 22.* about the coast of *Plimouth*, which is later than that of the coast of *Kent*, but sooner than that on the *Severn*. And I doubt not but in other parts of the world will be found other Varieties.

The reasons of these Varieties are (as I have formerly signified) to be attributed to the particular Position of those parts, rather than to the *general Hypothesis*. Of which this, in brief, may serve for some account at present. The *General Hypothesis* of the Earths *diurnal Motion* from West to East, would cast that of the Waters, not following so fast, from East to West; which causeth the constant Current *within* the *Tropicks*, where the Circles are greatest, west-ward from the Coast of
Africa

Africa to that of *America*, (which is also the Cause of the constant *Eastern Brize* blowing in those parts.) But the Sea thus beating on the Coast of *America*, is cast back as with an Eddy on either hand, and consequently returns from the *American* shore East-ward towards the Coast of *Europe*; where, the Parallel Circles to the *Equator* being less, and consequently the *Diurnal* Motion slower, doth not cast the waters so strongly West-wards, as between the *Tropicks*, and so not strong enough to overcome the Eddy, which it meets with from the other Motion, which gives the Sea a North-Easterly Motion (on these Coasts) as to its usuall course. The Current therefore of our Seas being *North-Easterly*, we are next to consider, at what times it runs more to the *North*, and at what more to the *East*. When it runs most *Northerly*, it runs up the *Irish Sea*, and so up the *Severn*: When most *Easterly*, it runs itreight up the *Channel*, and so to the Coast of *Kent*: When *between* these, it beats against *Devonshire* and *Cornwall*, and those parts. We are therefore to consider (as to the *Annuall* periods) that the *Annuall* Motion of the *Earth* in the *Zodiack*, and the *Diurnal* in the *Equator*, are not precisely in the same direction, but make an Angle of $23\frac{1}{2}$ deg. at the *Equinoxes*; but run, as it were, parallel at the *Solstices*: And as they be nearer, or farther from these points, so is the Inclination varied. Which several directions of Motion, do cause the *Compound* Motion of both to vary from the *East* and *West* more or less, according as the *Sun's* Position is farther or nearer the *Solstices*. And therefore, *nearer* to the *Equinoxes*, this Inclination doth cast the Constant current of our Seas more to the *North* and *South*; and *further* from it, more to the *East* and *West*. Which is the reason why the Current up the *Irish Sea* is nearer to the *Equinoxes* (at the beginning of *March* and end of *September*) and up the *Channel* or *Narrow Seas*, farther from it (at the beginning of *February* and of *November*;) and against the Coasts of *Devonshire* and thereabout, at some intermediate time. And thus much I thought fit to signifie upon this occasion. Dat. *Oxford* the 7. of *March* An. 1667.

Another Letter

Written by the same Hand, concerning some Mistakes, to be found in a Book lately publish'd under the Title of SPECIMINA MATHEMATICA Francisci Du Laurens, especially touching a certain Probleme, affirm'd to have been propos'd by Dr. Wallis, to the Mathematicians of all Europe, to solve it.

Accepi (V. C.) ante quadriduum, quem mihi misisti Francisci Du Laurens Tractatum, cui titulus, SPECIMINA MATHEMATICA, &c. eumq; mox evolvi, quo Tibi possim (quod petis) quid de eo sentiam, paucis ostendere. Videtur autem plus fronte polliceri, quam opere absolvit. Prioris libri pars magna, ex Oughtredi meisque scriptis (utut neutrius ibi meminerit) videtur desumpta, idque tam manifeste, ut non modo peculiare loquendi formulas, sed & ipsa symbola Notasque passim retineat. Posterioris, non parum ex Vieta, Schotenio, aliisque ab eo editis (quorum & subinde meminit) desumptum. Occurrunt inibi aliqua parum sana, & minime accurata multo plura. Quanam autem sint illa Genuina Principia, Veraque Geometriæ Elementa, hucusque nondum tradita, quæ Titulus pollicetur, non reperio: Longeque diversimode Hic & Ego sentimus, dum pag. 141. Neminem esse, opinatur, qui hæc sua non præferat ingenti Euclideorum Elementorum Multitudini.

In calce, manifestam mihi facit injuriam, ea de me affirmans, quæ veritique non sunt. Appendicem quippe subjungit, cui speciosum hunc fecit Titulum, Solutio Problematis, à D. Wallisio totius Europæ Mathematicis propositi, sed prius ad generale revocati, A. MDC LIII. eodem tempore, quo propositum erat.

Post Titulum, hæc sequuntur. Problema D. Wallisii, Datis Ellipseos* maximis Diametris, tum puncto in transversa ejus Diametro assignato, reperire in numeris segmenta lineæ intra Ellipsim terminatæ, & per datum punctum transeuntis, atque datum angulum cum dicta diametro facientis.

* Pro, Ellipseos, errore Typographi, sine dubio

Verum quia propositæ Quæstionis solutio æque facilis est in numeris, ac in lineis (ut postea apparebit) melius facturum me judicavi, si prius demonstrationem Analyticam hic asserrem, ex qua tum Numerica, tum Geometrica sequeretur, ad problematis solutionem pertinens, effectio. Atque ut hæc solutio cum fænore detur, speciale D. Wallisii problema ad generale sic revoco.

(Postque hanc Præfationem Problema sequitur tanquam suis verbis expositum cum sua ejusdem solutione per septem continuas paginas.)

Ad quæ hæc dicenda nunc habeo.

1. Totius Europæ Mathematicis, ob rem hujusmodi, in arenam vocare, jaſtantia genus est, cujus ego hæc nus reus non fui, (credo) nec futurus.
2. Si libuisset (ostentandi gratia) sic fecisse, legissem certe quod vel majoris esset difficultatis, vel majoris momenti, Problema, quam hoc esse videtur,

utpete

ne pote quod mediocris *Algebrista*, primo intuitu, semibora spacio facile solveret.

3. Nec sane hoc Problema, nec quod huic aequipollcat, unquam Ego (quod memini) ulli mortalium, nedum totius Europæ Mathematicis, proposui, (nescio an ulli unquam propositurus:) nec quicquam hujus, quod de me persuaderi sibi passus est, verum est.

4. Erat quidem aliquando Problema huic non prorsus absimile mihi propositum (cujus & solutionem protinus expediebam) sed à me propositum nemini, quod quatenus me spectare possit, videas in Epistola quadam mea, ad Nobiliss. Vice-Comitem Brounker data Maij 11. 1658. (quem annum innuit D. Dularens) eoque anno in meo Commercio Epistolico p. 171. typis vulgata, in hæc verba;

Sub initium Februarii jam proxime elapsi, amicorum non-nemo, cui forte occurrebam sero vesperi, quæstionem sequentem mihi porrexit in scriptis, quam jam nuperrime intelligo typis vulgatam esse cum hac Epigraphæ;
 “ Spectatissimos viros, Matheseos Professores, & alios præclaros in Angliâ
 “ Mathematicos, ut Problema solvere dignentur, Jean de Montfort maxi-
 “ me desiderat.

“ Extremis Ellipseos Diametris, distantia centri ab aliquo puncto in Axi
 “ transverso, ubi linea eundem secet sub angulo dato, in numeris datis;
 “ segmenta ejusdem lineæ (si opus est) productæ, & intra transversum Axem
 “ & Ellipsin terminata, in numeris invenire.

Hanc Ego quæstionem, suam ratus (neque enim vel innuebat Ille, vel Ego tum sciscitabar cujus erat,) paulo adhuc universalius expositam, sub ea fere, quæ subest, forma (neque enim ipsissima verba memini) postero mane solvebam: Nec eram de illa ultra sollicitus (quippe quæ nec magnæ videbatur difficultatis, nec momenti,) quam etiam, ut nunc audio, varii variis modis solvebant, ut ut eorum solutiones nondum viderim.

(Ac deinde sequitur mea istius Problematis, universalis adhuc propositi, solutio, cum annexa demonstratione, brevis & perspicua; saltem si excipias præli sphalmata; quæ tamen qui hæc intelligit, facile restituet.)

Atque hoc omne illud est, quod Ego de hoc Problemate fecerim, quo id ut latenus ad me spectare videatur. Num autem hoc sit (quod vult D. Dularens) Problema illud totius Europæ Mathematicis, a Me propositum esse; Ego cuilibet judicandum permitto, qui Latina intelligit, utcumque fuerit Matheseos ignarus.

Qui illud mihi monstrabat Problema (scriptum primò, postea typis impressum) est Dr. Richardus Rawlison. Quis autem fuerit ille Jean de Montfort qui proposuit, ignoro. Hujus autem impressa Chartula Londini tum temporis satis perorabat, pluribusque Mathematicis peritis proposita, cætera Problema exhibens ex Gallia delatam, quod & ex nostris aliquot Londini solvebant: Quorum unus (Dr. Christoph. Wren, tunc quidem in Collegio Greshamensi Londini, nunc Oxoniæ Astronomiæ Professor) solutionem suam typis editam publici juris fecit: simulque (in eadem charta) reposuit Problema aliud, quod ipse præstantissimis in Galliâ Mathematicis (uti illud inde nobis in Angliâ) solvendum proposuit, quod illorum nemo (quod sciam) hætenus solutum dedit. sua verò istius solutio exat in meo de Cycloide Tractatu, p. 71. 73.

Cum itaque sint hæc omnia (quod dicitur) publica & notoria, non possum non mirari, quo animo D. Dularens palam & in publicum ederet rem tam ab omni veritate alienam.